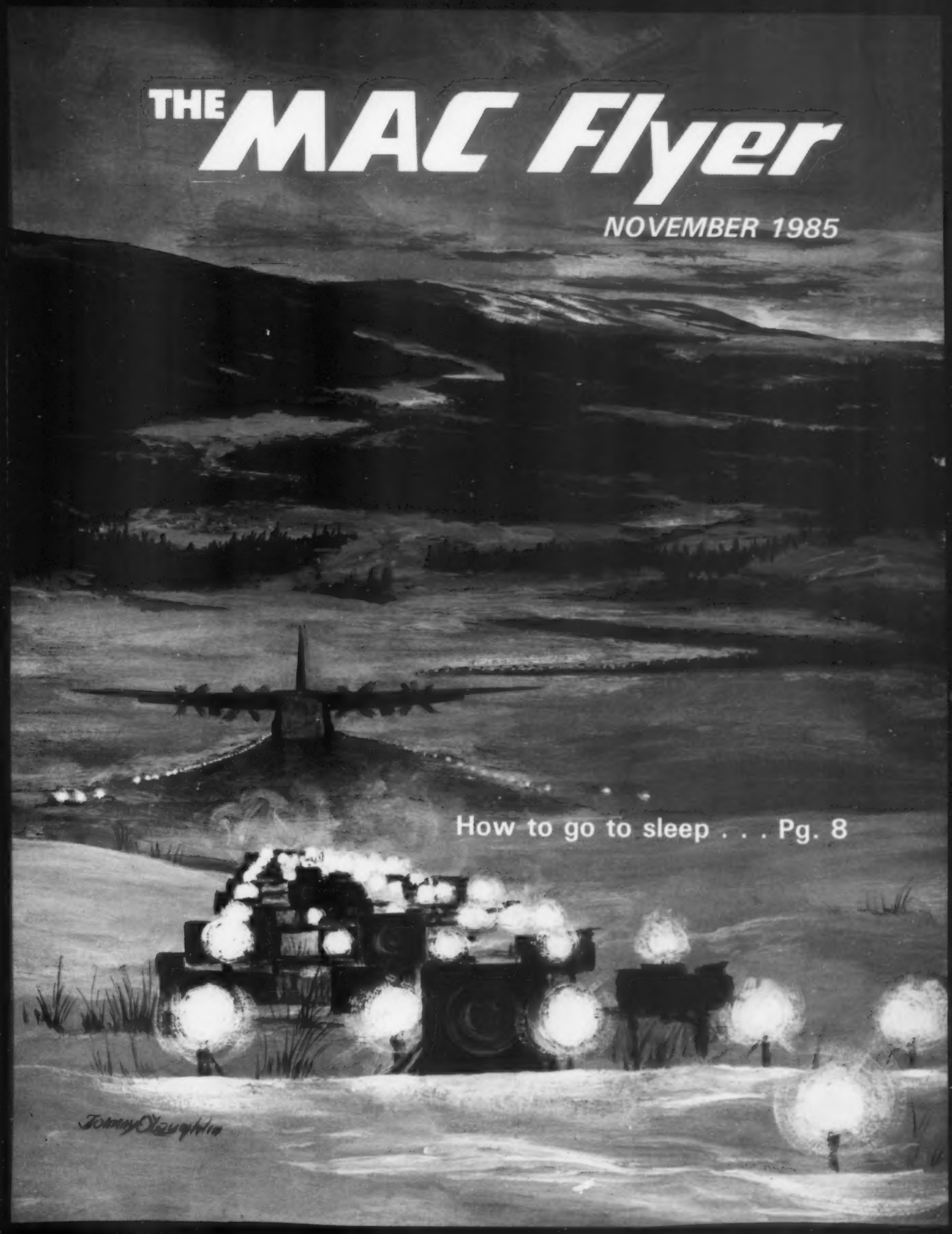
THE MAC Flyer
NOVEMBER 1985
How to go to sleep . . . Pg. 8

THE MAC Flyer

For Greater Safety in MAC Air Operations

November 1985 | MACRP 127-5 | VOL XXXII NO. 11

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The MAC Flyer is published by the Director of Safety, Military Airlift Command. The contents are informative and not regulatory or directive. Names of people and places in mishap stories are representative and not necessarily of the aircraft or equipment involved. Information in any article may not be construed as incriminating under Article 31, UCMJ.

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Send for Help Today!

Tired of Total Physical Efficiency?

You've seen them on the backs of matchbook covers and inside your favorite comic books. They're everywhere the cultured reader might glance. Charles Atlas was one of the predominent advertisers in this marketplace for wimps. All those ads were aimed at helping the guy or gal with only 4% body fat and a penchant for perusing novels of excessive lengths to become behemoths. But what about the rest of you? Just because those of you interested in the world of aviation walk about with ripples of striated muscle clearly visible through your nomex suits, the commercial world neglects you. They have yet to discover *your* basic need.

Yes, you tire of people gawking in awe at your typical aviation-induced biceps. You suffer the frustration of being rejected time and again because your firm, washboard abdomens leave those not interested in flight with the mistaken impression you have a single digit IQ. Meanwhile the "well read" quiche eaters and other yuppies frolic in societal fantasia. Well, there's finally hope! Yes, there is a road back. You needn't remain a finely sculpted male or female symbol, taunted, teased and tormented just because those who care about flight safety always maintain perfect physical stature. It's as easy as picking up pen and paper. Imagine! There you are, right after your seventh set of pyramids to 390 lbs, deliberately putting word to parchment. Think of the effect it'll have on the general populace. You can hear them now. "Not only that," they'll say, "I saw her/him *writing*!." Not enough, you say? Well what if your little experiment in literary reward included a safety message?

"Too difficult. They'll never believe that I could not only *write* something, but write something with a flight safety theme. They just won't accept it."

Right? Well, maybe before, but don't be too sure. Now you have a way to prove beyond any doubt that you **can** do other things besides working out or other flight related activities. If your story is creative enough, with a strong, delicately interwoven safety message, you could be one of the twelve authors who will have their story published in *The MAC Flyer*, the world's most respected safety publication.

You might even emerge the winner. That would really blow their minds, wouldn't it? You just sit down, and while you're working your left little finger with 120 lbs curls, (unless you're left-handed) write a story following the guidelines listed below. Once complete, just drop it in the mailbox during one of your daily practice marathons sometime before March 31, 1986.

Check the minute print below with all the detailed rules which accompany any worthwhile contest. The thrill of publication, redemption of your cerebral reputation, and social acceptance, not to mention beating out Miss Sedentary or Mr. 98 lbs of 1986 for once, is only a story away!

THE RULES

The 1986 MAC Flight Safety Writing Contest is conducted according to MACR 900-3 and these rules. All entries must be original, unpublished and postmarked no later than 31 March 1986. Stories must be between 1,000 and 3,000 words long (about 6 to 14 double-spaced typed pages). Poetry should be about 75 to 100 lines. Entries must contain an *aviation safety/mishap prevention message*. Manuscripts must be double-spaced, typed and submitted in two copies. Identify entries by title only and attach a cover sheet showing the author's name, address, duty phone number and unit. The cover sheet must contain a brief autobiography.

The contest is open to anyone. Entries qualifying under the above rules earn their author a free one-year subscription to *The MAC Flyer*. However, contest prizes (desk sets and plaques) may only be awarded to military members and civilian employees of the Department of the Air Force or Air Reserve Forces. Other entrants may be selected for Honorable Mention in a special category. All winning stories will be published in *The MAC Flyer*. Entries should be addressed to:

Flight Safety Writing Contest
HQ MAC/IGFE
SCOTT AFB, IL 62225-5101

Interview by Major Thomas C. Weinzierl
Supervising Editor

Safety: The Commander's Viewpoint

***TMF*— Sir, would you please relate some of your safety philosophy and how it applies to MAC?**

General Cassidy—To emphasize safety's importance, you almost find yourself out of words. It seems trite to say the most important thing we do everyday is maintain the safety and security of our people and equipment. I put it in that order purposely. Safety must be emphasized by commanders and practiced by everybody. The older you get, the more you fly airplanes and the longer you fly them, the more convinced you become of those things you've learned as a young airman or officer—you've seen the mishaps which could or should've been prevented. So you become very attuned to the term safety. More practically stated, we have a responsibility to provide a readiness capability to the country, and as I assume the duties of CINCMAC, readiness and safety in executing our mission takes on increased importance for me. I look at the command and what it can, what it should and what it must do. I want to make sure we have all the people and equipment we need. I want to develop that concept. For instance, because of needless accidents we have two severely damaged C-5s, which we can't use. This has lessened our readiness capability. I believe all of us have an obligation to the country, to each other and to the people flying in the back of our airplanes to make sure the job is done better than it's ever been done before. It should be done better this year than last; it should be done better next year than this, and safety is a terribly important aspect of doing it better. So you'll hear a lot from me on safety, principally in terms of supervision. We have very young people flying old airplanes. We have young people who can do almost anything. They're capable and very competent. They all need supervision, whether on the flightline, in the office building like our headquarters, or out flying the MAC mission. We need to help each other out and I think supervision is the key.

***TMF*—What role do you feel commanders and supervisors, at all levels, play in preventing flight mishaps?**

General Cassidy—I think they're absolutely essential. Again, supervision is the absolute key to safety. Many people have said safety is a state of mind; that it's a mindset; it's habit patterns or behavior modification. I guess it's all of that. I know the most important ingredient in our safety program is command supervision and leadership at all levels. We find ourselves thrust into supervisory roles in the Air Force at a very early age and I think we should take stock of what those roles are and take them very, very seriously. I certainly do.

***TMF*—What are your specific safety goals for MAC?**

General Cassidy—I want to make sure there is not a single MAC member lost to a preventable mishap of any kind, on or off duty. That's a difficult goal because so many things can happen to our people, including acts of God. There are a lot of us serving all over the world and susceptible to hazards all the time. But my first goal is to make sure that each person in MAC is well taken care of to do whatever they do, safely. That applies not only to the member, but his or her family as well.

***TMF*—What are your thoughts on the role of aircrew standardization in MAC's mishap prevention program?**

General Duane H. Cassidy

General Cassidy—I think that's a critical part of it. There are several different ways of doing many things, all of them generally acceptable. You take, for example, the very simple task of sweeping the floor. There are lots of ways of doing that, and generally if the floor is clean when you're done, the method you've used is acceptable. In my book, however, there's only one safe way to fly an airplane—the correct way, the way it's written in the book. Our airplanes, for the most part, have been around for a long time. The airplanes new to our fleet still have an awful lot of experience behind them. Many people have put a lot of thought into the procedures we have. We must realize the procedures should be followed to the letter, and I mean specifically and in absolute terms, *to the letter.* For instance, checklist responses should be exact everytime. What we have to do is create a crew force that will do it right everytime, whether stan eval is watching or not. This applies to the whole spectrum, from the things which seem most critical to life, limb or machine, to the seemingly mundane things such as a radio call or a checklist response. So you'll get a lot of pressure from me on standardization. I'll be as severe with the casual, cocky aircrew member, who'll skip a checklist response, use the wrong terminology, or who will stutter or stammer on the radio, as I will be with the guy who puts the flaps down at an inappropriate airspeed. Because I think these are symptoms of how they do things or behave.

***TMF*—How do you view the balance between flight safety and the demands placed on MAC crews during contingencies or exercises?**

General Cassidy—In all of my years of flying, I haven't seen anything that you could not do according to the book and do it safely. But, our procedures are very flexible to insure the latitude for judgment—the latitude to do things outside the scope of the regulation, as long as they are properly done and then reported. If you're forced to do something, for instance, that stresses an airplane, there are provisions to write it up and get that airplane part, landing gear, flap, or engines checked afterwards. If, for very good reason, you have to violate one aspect of a regulation, other portions of the regulation are very clear about what you do about it. We stand behind our people if they're required to do something that's abnormal, if they thought it through, or if there's a clear reason for it, if the mission demands it of them, or if they've been directed to do it. I'll stand behind them. There's no reason we shouldn't. If, on the other hand, someone deviates indiscriminately, we'll ask them why they did it. What caused them to do it? We'll want to know why. We're asked to do a lot of things, and lots of those things require judgment, good judgment. If we train everyday to a specific high standard, our people will be well trained to take care of the judgmental options. I don't find any contradiction between increased demands and changing scenarios in a very standardized operation.

***TMF*—Primacy of flight is a concept which has drawn quite a bit of attention recently. How do you view this concept in terms of MAC's mishap prevention program?**

General Cassidy—I think anything you do that focuses attention on the primary mission, which is flying, will have a positive effect on safety. However, I don't think the primacy of flight issue is necessarily aimed specifically at flight safety. It's aimed at many other things—operational, administrative, career, all sorts of things. So I don't think we should confuse the concept of primacy of flight with flight safety. You can have flight safety and not necessarily have the world's best primacy of flight program. On the other hand, the primacy of flight program will support our flight safety program. The primacy of flight program is long overdue; in fact it bothers me that there is such a clear need to reemphasize such basic notions. It says that we have strayed a bit from the principal mission of the command and the Air Force. Primacy of flight says we're pulling our thoughts, our focus back to that mission. It's a program that is long overdue and you'll hear a lot about it from me. I think General Ryan started something that will be a precursor for an Air Force-wide program.

***TMF*—Of the 13 Class A flight mishaps in 1984 and 1985, eight were directly attributed to human factors rather than materiel or other factors. What actions should commanders take to eliminate this trend?**

General Cassidy—I can answer that quickly. Clearly the principal factor is supervision. Over the last five or six years I have examined in excruciating detail, each and every facet of every flight mishap in this command. I would hasten to say that there were very few directly attributable to materiel problems. Even in those few cases, some supervision could have played a part in either making the accident less catastrophic, or even preventing it. What that says, once again, is that supervision plays a very, very strong role, as it should. That's exactly what the term implies. Inadequate command supervision has played a central role in every accident I have seen in this command—every one. I think we have to recognize that people are only human, people will do things at times that are either unpredictable or unexplainable and that's where supervision comes in. What good supervision says is we really care, we care enough to keep an eye on you, watch you, and make sure you have what you need to do the job well.

***TMF*—What effect will the C-130 Executive Review initiatives have in promoting your safety goals in MAC?**

General Cassidy—It will take one of our major systems, the C-130, and make sure that *we do* have the right tools of the trade, the right procedures, the right goals, the right kind of equipment, and the trained people to do the job. I think that's where the key is. We can't make our supervisors supervise something which is not valid. So what we'll do is validate the C-130 program. That validation process will come back to us, to commanders and supervisors at all levels, and say, here is what the C-130 program is today. There are some things that need to be changed. We'll change them. In fact, there are some initiatives from the C-130 review that have application accross the entire command—we're studying them. Things that

don't need to be changed will be validated once again, and this will say to our *supervisors, these are the proper procedures to use to do the job--make sure our people use them.*

***TMF*—What do you think are some of the things that help motivate aircrews to fly safely?**

General Cassidy—I think the biggest thing of all is the absolute enjoyment of doing things professionally. I use that term in its classical sense. I think the people we have in the command and in the Air Force are of such high caliber they want to do things right the first time. They enjoy doing them professionally. They don't enjoy being sloppy, they don't enjoy being second best. They're high achievers. They are people who want to do it right. If there is one thing that will dissuade them from doing that, it's a lack of people saying to them, "right-on guys, that's the way to do it." That's supervision. We need to increase that. There are some people who are more self-motivated than others, but it's the job of command and leadership to motivate our people and to identify those who can't or won't accept high standards.

***TMF*—What message would you like to give to safety officers and NCOs throughout the command?**

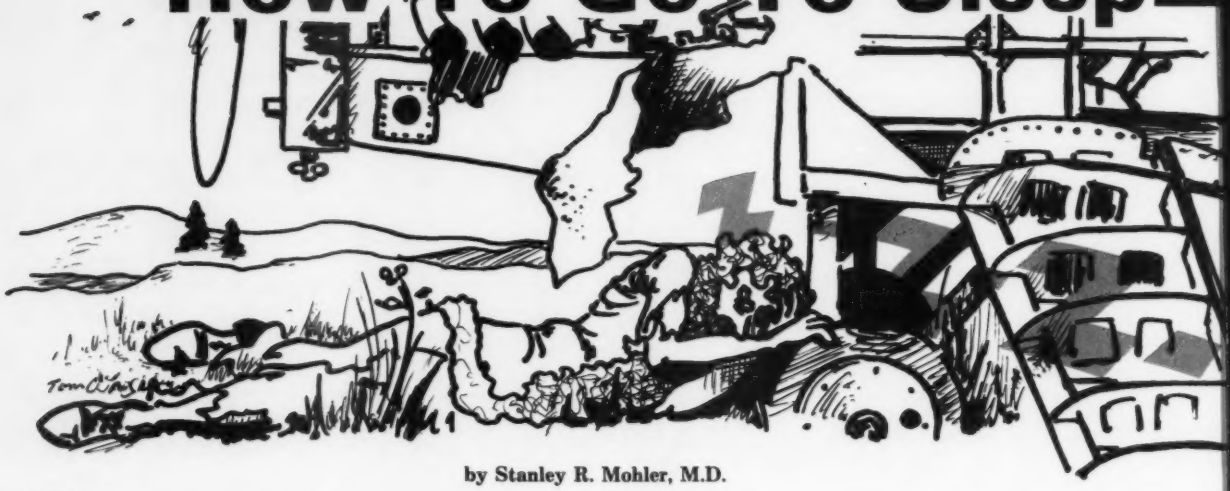
General Cassidy—That's really two questions. First of all if I were to talk to the people who manage our safety program that would include everyone in the command. Commanders and supervisors at all levels. On the other hand, for the safety officers, they're like our conscience. They should watch us daily to make sure our programs are out ahead, are active programs rather than reactive programs. There is a big difference. There is a saying I learned a long time ago: "You should always make your friends before you need them." I think you should always devise your safety programs before you need them. A safety program that's created because of a mishap or a problem is a reactive program. I would like to have active programs that prevent mishaps. So I would ask safety officers to be very active. They must have high standards and set high goals. They must know the command, know the mission. Don't worry about the easy jobs, go find the tough ones. That's where the risks are. Go find out who's taking the risks, where and why. Make sure we don't take any unneccessary risks. That's something that we need to let our safety officers know. I want them to realize as I travel the command, that I'll want to know what their active programs are.

***TMF*—Are there any final comments you'd like to make, Sir?**

General Cassidy— It's nice, once again, to be with the people of MAC. Our mission is staggering in its size and its impact on the world. It's indeed a mission of global importance. We demand much from our people, physically and mentally, in both their professional and their personal lives. We extract from them an awful lot of not just work but of their youth. I hope that we can pay them back with the national recognition they deserve. They are very important to this country. What they do is not a common job. It should not be taken lightly by any of them. If they ever do start to take it lightly, they should stop and take stock of what the mission is. I think a great part of our job is to get back to what the mission is, what our goals are, what we've planned and what we're doing. You suddenly realize it is so important it must not be left to the people who would do it carelessly.

***TMF*—Thank you, General Cassidy.**

How To Go To Sleep



by Stanley R. Mohler, M.D.

Sleep is a natural phenomenon common to all higher animals and is absolutely essential to normal functioning. Natural sleep is a recurring transitory state of the brain and body, brought about by the central nervous system and the various body organs. These organs include the sensory organs, the skin, the musculoskeletal, cardiovascular and gastro-intestinal systems and certain others. Adequate sleep is necessary for an alert, wakeful state, good memory and an overall generally healthy condition. Sleep deprivation has been directly correlated with diminished alertness and error-prone performance—adequate sleep is a requirement for assuring safe pilot performance.

Our objective in this article is to provide the reader, especially aviators, with an understanding of sleep and to describe a method that for many will be a useful way to fall asleep. Due to flights across time zones yielding circadian disruptions, and due to night flights, with forced wakefulness often followed by daytime sleep, aviators may encounter special problems initiating sleep.

The Sleep Process

Many active processes take place during sleep, including mental flights of fancy with imagery, logical analyses, emotional binges, and problem-solving. The emotional and imaginative repertoires are exercised from one extreme to the other. These are healthy brain functions, and they produce original and creative concepts. Many creative persons learn to sort through the hundreds of dream-generated concepts and pull out those that have potential application.

Many persons are naturally able to fall asleep rapidly. Others toss and turn, become fretful and find the natural induction of sleep a difficult undertaking. These latter individuals fall prey to the purveyors of "chemical sleep inducers" and lead a life of irritability with periods of irrationality and lowered productivity. Depression and fatigue are common in these individuals, as is a tendency toward psychosomatic illnesses.

Kales and associates made a national survey of U.S. physicians in 1976. These physicians reported that one-fourth of their patients had sleep disorder complaints. Kales was also involved in a study of the public in Los Angeles, California, where 52 percent had a current sleep problem when surveyed. Webb and his associate have found that the population free-cycles on a 25.2-hour day (average for the population), indicating that even without the disruptions of flight across time zones and/or night flights, the 24-hour day is somewhat short for many.

Natural Sleep

In the primitive state, human sleep induction was no doubt generally as swift as one sees in cats and dogs. These animals lie down in a selected location with some turning, stretching, and relaxation motions,

all serving as sleep-inducing procedures. A deep breath or so is taken to slow the respiratory rate. Within a short time, the animal is quietly sleeping.

The Stages of Sleep Recapitulated

Sleep can be considered as a special state of unconsciousness, but a state in which the sleeper may readily be restored to consciousness by a proper stimulus.

There are four arbitrarily defined stages of sleep, **Stage One** the lightest, **Stage Four** the deepest. The electroencephalogram identifies the actual stage of sleep. There is normally an intermittent fifth mode of sleep. "rapid eye movement" (REM) sleep, that accompanies dreaming.

Typically, an individual will rapidly sink to Stages Three and Four in the initial one to two hours of sleep (involving about 20 percent of the total seven to eight hours of sleep). The remaining period of sleep will occur mostly at lighter levels, accompanied by REM episodes.

During REM sleep, the brain is actively dreaming, running through a spectrum of imagery and emotions. To keep the body from acting out these inner experiences, the nervous system produces a paralytic state, and the skeletal muscles can only make some feeble twitches. However, respiration, heart rate, and blood pressure may all increase. During this and other sleep phases, complex mental problems may be solved, as the brain is just as active when in REM sleep as when awake.

REM sleep may account for 25 percent of the total sleep, with REM activity usually greater in the last two hours of a seven-to eight-hour sleep period.

If, due to a short period of sleep, the REM sleep time is much contracted, there often is a "make-up" effect when the next normal sleep is being obtained. The sleeper experiences a night flooded with dreams. This is considered to be a compensatory, healthy occurrence, overcoming a "dream deficit." It has been suggested by some scientists that dreaming is a healthy emotional outlet, allowing the discharge of certain uncomfortable mental tensions.

Sleep deprivation of 48 hours or more has caused some persons to hallucinate, become irrational, and lose the ability to concentrate. The "absent-minded" periods of sleep-deprived individuals are now identified as "micro-sleep." A good period of sleep provides recovery from the above symptoms. Lesser periods of sleep deprivation produce less drastic symptoms. These may, however, have highly significant safety consequences for pilots.

Self-Induction of Natural Sleep

Lie on the bed in either loose-fitting garments or none at all. Relax the back and unroll the arms and legs somewhat, letting the body make a close association with the bed. Half close or close the eyes and think of something pleasant, possibly visualizing a beautiful scene, person, or event. Breathe slowly.

Begin slowly unrolling each distal finger joint (the joint furthest from where the finger joins the hand), starting with each index finger. Then unroll the distal joint of each middle finger, ring finger, and little finger. When these are gently unrolled, begin with the middle joint of each, then the base joint. Then, similarly, do the two thumbs. During this process, most persons fall asleep. The fingers are highly supplied with nerves, and the unrolling sends large numbers of specific stretch-receptor sensory signals into the brain, triggering activity by the sleep center.

If the above progression of relaxation does not produce sleep, relax the hands, wrists, and forearms in sequence. If sleep doesn't occur, progress to the upper arms, the shoulders, and neck. For the few who might not be asleep at this point, consciously relax the jaw muscles, the facial muscles, and the upper forehead muscles.

Correlates of Achieving Quality Sleep

There are three interacting areas that determine the quality of sleep: mind, body and environment.

Mind: An anxious, agitated, or worried individual may not be capable of shutting off various emotional feelings when the time comes for sleep. A depressed individual may be able to fall asleep but not remain so. Part

of the ability to fall asleep rests in the development of a self-capability to temporarily blank from consciousness troublesome thoughts or emotions. Intentional blanking of these thoughts may be self-induced as a result of individual mental ability, by deliberately diverting one's thoughts or emotions to other less disturbing topics or feelings, by reading, listening to a radio, or watching television.

Body: Since the mind and the body are essentially inseparable, dividing the two is artificial and is herein done purely for conceptual purposes. (The same may be said of the body and its environment.)

Pain, whether from joints, muscles, tendons, or other parts of the body, interferes with the onset and the quality of sleep. Headache is a sleep derogator, especially the headache of alcohol hangover. Dermatitis or insect bites, accompanied by itching, will delay the onset of sleep and cause poor-quality, fretful sleep. Nocturnal peptic ulcer pain will wake persons, as will colic due to gall bladder or renal stones.

A gastrointestinal tract excessively full of food, especially rich, seasoned food, will cause a fretful sleep. Conversely, the churning of a starved intestinal tract will interfere with sleep induction. A full bladder will cause frequent wakenings and, if not relieved, will cause light sleep and dreams of urinating. Nausea and vomiting due to food poisoning or alcohol excess are derogators of proper sleep. Head colds, flu, and other conditions causing respiratory impairment; even snoring may reduce the quality of sleep.

Toxic substances such as alcohol, nicotine, and drugs pervading the body are detrimental to natural sleep and produce what is referred to as "chemical sleep." Upon awakening, the individual still retains a somewhat groggy mental state, rather than feeling refreshed.

Environment: A comfortable bed of adequate length, neither too soft nor too hard, is ideal for achieving a restful sleep. The room temperature should be comfortable, neither excessively hot nor cold. However, if cold, adequate blankets should be present. Many find an attractive bed partner an asset in achieving quality sleep over the long haul. Some persons, however, have to sleep alone to accomplish adequate sleep.

Additional desirable environmental factors for sleep include quietness, darkness, and an odor-free air. Absence of biting insects and of any type of potential threat is also necessary to restful sleep.

Alcohol, Heroin, and Drug-Affected Sleep

The same deficient sleep qualities affecting tobacco addicts are true of regular uses of, or addicts of, alcohol, heroin, morphine, tranquilizers, amphetamines, bromides, or any other chemical substance. All sleep-inducing medications produce a "chemical sleep" not nearly so refreshing as naturally induced sleep. The nervous system is derogated not only in the waking state by these substances but also in the various stages of the sleeping state.

Nicotine addiction (especially in cigarette smokers) has an adverse effect on sleep quality. The nicotine addict's nervous system requires this substance each half hour in order that normal brain function can occur. This applies to the sleeping as well as the waking state. As a result, the smoker does not get a deep sleep of high quality, but rather has a fretful, light sleep due to the demand of the brain for nicotine. Many nicotine addicts wake several times in the course of a sleep period in order to smoke. These repeated wakenings plus the nocturnal nicotine deficiency state produce chronic adverse brain functioning in nicotine addicts.

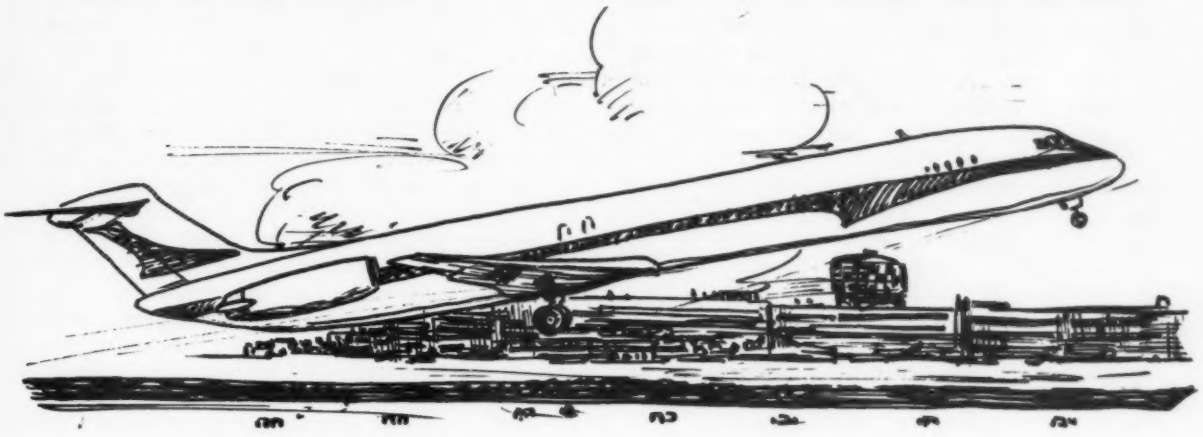
Comment

The corporate, charter, airline or any other pilot engaging in night flights, long-distance flights, or flights across multiple time zones must understand the nature of sleep if adequate rest is to be obtained. The NTSB continues to report dozens of general aviation accidents having fatigue as an associated cause factor.

Research continues on the subject, and much remains to be learned. For example, biofeedback techniques hold promise for training aircrews in the efficient induction of sleep. Pilots as well as company management must understand that the human element is not an inanimate plug-in component but rather a phasic system with a periodic need for sleep rejuvenation. At stake is the overall air safety level.

Courtesy *Flight Crew*

Mishap With A Moral



LLWAS Limitations Contribute to . . .

"Shear" Terror

Since 1970, the National Transportation Safety Board (NTSB) has identified low-level wind shear as a cause or contributory factor in 15 accidents involving transport-type aircraft. Of these 15 mishaps, six resulted in loss of life. Twelve of the fifteen were the result of aircraft encountering convective downbursts or microburst winds associated with thunderstorms. One of the more fortunate encounters with this phenomenon occurred aboard United Airlines Flight 663 on May 31, 1984, as the crew attempted to depart Stapleton International Airport, Denver, Colorado.

Sequence

UA 663, a Boeing 727, was scheduled to fly from Denver to Las Vegas. It carried 98 passengers and seven crewmembers. Enroute to runway 35L, the crew monitored ATIS information "X-ray," which advised Stapleton was experiencing clear skies, temperature 83° F, dewpoint 39° F, wind 290° at 14 knots and altimeter 29.94.

Takeoff speeds V_1 and V_R were 139 knots, and V_2 was 150 knots based on a takeoff gross weight of 150,000 pounds and a 5° flap setting.

Several flights were waiting for takeoff clearance, so at 1316 mst (Mountain Standard Time), ground control cleared UA 663 to taxi to a holding area where the captain positioned the aircraft and shut down one of the two engines he'd used to taxi. While holding for takeoff clearance, the flightcrew discussed the local weather conditions. They noted high overcast clouds with some virga* in the area. Based on existing weather conditions, the captain elected to use maximum EPR and 5° of flaps for takeoff.

At 1321, ground control directed UA 663 to taxi into a position next to another United Airlines Boeing 727 also awaiting departure and to monitor tower frequency for takeoff sequencing. UA 663 was ninth in line for departure.

Between 1323 and 1332, the tower controller cleared 16 aircraft for departure. Eleven departed from runway 35L and five departed 35R. The controller made three wind reports, each stating the wind was steady from 290° to 300° at seven to nine

* Wisps or streaks of water or ice particles falling out of a cloud, but evaporating before reaching the earth's surface as precipitation.

that as the aircraft accelerated back to V_R speed, the 2,000-foot runway "hash" marks, or overrun markings, flashed by the corner of his eye. At this point, he rotated the aircraft once airborne, the Dash 7 reported a 25-knot airspeed loss at about 200 feet above the ground. Immediately afterward, the controller provided the wind shear report to four other departing flights. At 1330, the controller sequenced UA 663 number three for takeoff on runway 35L. At 1339, the controller asked a departing DC-9 if he encountered a wind shear during his 35L departure. The DC-9 crew indicated they had not.

After receiving the sequencing instructions, the captain of UA 663 made an announcement to the passengers that the flight was preparing for takeoff. He instructed the flight attendants to remain seated because of expected turbulence on departure and advised all passengers and attendants to be sure their seatbelts were tightly fastened. He later stated, "Except for the absence of heavy cumulonimbus clouds, it looked like a typical Denver afternoon." Aircraft radar indicated a thunderstorm cell 25 miles northeast of the airport.

The captain performed the takeoff with the left air conditioning pack turned off and the right one on. The second officer stated that once they started their takeoff roll, he heard an aircraft ahead of them report a hesitation in acceleration on the takeoff roll at midfield. Midway down the runway, the air-speed seemed to hesitate at 120 knots. As the first officer called out the words, "We're slow in accelerating," the airspeed began increasing normally. The captain felt the hesitation was due to the midfield crosswind observed earlier. He momentarily considered aborting the takeoff when the airspeed hesitated but decided against it when it began increasing normally.

The captain rotated the aircraft just beyond V_R speed at 141 knots. During rotation, the first officer advised the captain, "Your airspeed is falling off." The second officer called, "You've lost 20 knots." The captain stopped aircraft rotation at about 9° to allow for acceleration to V_R speed. The second officer told the captain his rate-of-climb was zero but the climb attitude, or body angle, looked good. The captain stated knots. At 1326, the controller cleared a deHavilland Dash 7 (four-engine turboprop) for takeoff on runway 35L. The controller made no mention of wind shear. However, to the proper climb attitude. The captain recalled the airspeed suddenly increased to V_2 plus 30 knots and stabilized when the aircraft was about 700 feet above the ground. The crew was unaware the aircraft had struck part of the localizer antenna during the takeoff.

While performing the "after takeoff checklist," the second officer of UA 663 reported to the captain he was unable to pressurize the aircraft. The crew made several unsuccessful attempts to pressurize the aircraft through the standby and manual modes. Since they were unable to correct the problem, the captain decided to return to Stapleton for repairs.

At 1405, UA 663 landed uneventfully on Runway 26L at Stapleton. Postflight inspection revealed a 4-inch by 5-foot gash on the right side of the aircraft, forward of the aft cargo door and a crease in the outer skin on the opposite side of the fuselage. There were no injuries to the 98 passengers and seven crewmembers aboard the aircraft.

Analysis

The aircraft was certified, equipped and maintained IAW federal regulations and approved procedures. There was no evidence of a malfunction or failure of the aircraft, its components, or its engines which would have affected its performance. The flightcrew was properly certificated, qualified and experienced. Each crewmember had received the training and crew rest time prescribed by the FAA. The Safety Board concluded the accident was the result of a wind shear encounter.

The weather at 1334, the time of the mishap, included a broken ceiling estimated at 8,000 feet. Visibility was 50 miles and the wind was from 290° at 25 knots with gusts to 32 knots. A gust recorder at Stapleton showed increasing wind speed from a low of three knots at 1315 to gusts of 32 knots at approximately 1330. The National Weather Service radar at Limon, Colorado, indicated several thunderstorms within 65 miles of Stapleton at 1230. The closest thunderstorm was of moderate intensity and located 12 miles southwest of the airport. The strongest

activity was created by three cells with very heavy rain showers about 35 miles south-southeast of the airport.

By 1330, the thunderstorm activity at Denver had increased. Stapleton was within an area of rain showers including a heavy cell seven miles to the west. There was also an intense cell about 20 miles southeast of the airport. Maximum thunderstorm tops were 29,000 feet, 30 miles southeast of the airport. The cells were moving from the southeast at 20 knots.

Stapleton is surrounded by mountains. Pilots and ATC personnel stated it's not uncommon to have numerous wind shears acting upon the airport daily. For this reason, Stapleton has a Low Level Wind Shear Alert System (LLWAS). The LLWAS consists of five remote and one centerfield wind sensors. The five remote sensors are located north, northwest, northeast, east and southwest of the airport. The LLWAS is a computerized system designed to detect the presence of hazardous low-level wind shear by continously comparing the winds measured by the five remote sensors with the wind measured at the centerfield location. If the speed difference is equal to 15 knots or greater, the system is designed to produce a wind shear alarm.

The wind shear data are displayed on monitors installed in the airport control tower facility. The tower at Stapleton is equipped with two display units positioned at two controller positions. The wind shear data from all six sensors are displayed simultaneously on both monitors.

The wind shear report given in the takeoff clearance to UA 663 was not entirely in accordance with prescribed procedures. The controller is required to use the phrase "wind shear alert" when he issues takeoff clearance. While it's possible the captain might have delayed his takeoff, it's not probable since the captain had never heard that term before. None of the crewmembers recalled hearing the report of numerous wind shears. This is somewhat understandable given the tempo of takeoff operations and the rapidity with which the controller issued the clearance and the inflection in his voice. In addition, the wind data given are very complex and difficult to interpret in a very short period of time.

Studies have shown consistently that the human short-term memory limitation averages about seven pieces of data. Generally, there are five LLWAS sensors at selected airports. Adding the centerfield wind direction and velocity to each of the boundary sensors, controllers potentially can provide pilots with 12 pieces of numerical data, and more, when gusts are reported. It's almost impossible for a pilot to understand or act on 12 pieces of numerical data or even half that many. As a result, pilots often fail to perceive or analyze the significance of LLWAS reports. When aural information is transmitted from multiple sources at the same time, individuals "selectively perceive" the relevant information. Selective perception enables pilots, for example, to hear ATC instructions relevant to their flight only, thereby allowing them to cope readily with the many pieces of information received in a brief interval. However, these same individuals will have little or no memory of the information that was screened out through selective perception. This may explain, to some extent, why the flightcrew did not recall hearing the LLWAS winds but were able to remember other information such as, "cleared for takeoff." The Safety Board believes that to increase the value of the LLWAS, the information should be modified and presented in a manner that recognizes the limitations of human short-term memory and information processing.

While the information presented to the flightcrew through the LLWAS was not interpreted by them as creating a particular problem to their operation, other indicators of possible wind shear were also present. Convective activity, virga, large temperature/dew point spread, variable and gusty winds and blowing dust are some indications of a high probability of a microburst.

As a part of its wind shear training program, United publishes a policy of wind shear avoidance and recommended procedures for flying the airplane in the event of a wind shear encounter, in its operating manual. Included are the visible signs flightcrews should be aware of to assist them in practicing the company's policy of wind shear avoidance. United recommends flightcrews give serious consideration to delaying a takeoff or selecting another runway if strong wind shear "is known or suspected to exist along the takeoff path."

United defines strong wind shear as any reported airspeed change of 20 knots or more. All the signs listed in United's operating manual and operating bulletins were present on the day of the accident. These signs were:

- High-based thunderstorm activity.
- Widespread virga.
- Temperature/dewpoint spread of 40° or more.
- Blowing dust.
- Pilot and LLWAS reports of wind shear.

The Safety Board expressed concern over the flightcrew's perceptions of the potential hazards associated with wind shear. According to the second officer, if flightcrews responded to every wind shear alert, there would be 40 or 50 takeoff delays or cancellations each day at Denver. The captain stated, "I'd be surprised if a good majority of the flights did not encounter some form of wind shear coming into Denver." In addition, it appears flightcrews may not understand the significance of a combination of microburst indicators. Neither this flightcrew, nor nine other air carrier pilots interviewed, ever recalled delaying or cancelling flights due to unverified reports of wind shear. The Safety Board believes these factors have a bearing on the flightcrew's perception of the wind shear hazard.

The NTSB cited the crew for effectively communicating and coordinating their actions in response to the wind shear encounter during the takeoff. United Airlines has implemented a comprehensive training program in crew coordination and communication techniques which is given to all flightcrew members. This training program parallels instruction in aircraft operations in that crews receive initial and recurring training in the classroom and simulator. After initial instruction in crew coordination techniques, flightcrews receive and practice these techniques as part of their yearly proficiency training. The training sessions are designed to encourage flightcrews to communicate and interact within the cockpit as a unit. First and second officers are trained to provide input into the captain's decisions, while captains are trained to be receptive to such input. The NTSB felt this training contributed to the crew's success in flying the airplane through the wind shear encounter.

Probable Cause

The NTSB determined the probable cause of the accident was an encounter with severe wind shear from microburst activity following the captain's decision to take off under meteorological conditions conducive to severe wind shear. Factors which influenced his decision making include: (1) the limitations of the low level wind shear alert system to provide readily usable shear information, and the incorrect terminology used by the controller in reporting this information; (2) the captain's erroneous assessment of a wind shear report from a turboprop airplane and the fact he did not receive a wind shear report from a departing airplane similar to his own because of congestion on the air traffic control frequency; (3) successful takeoffs made by several other air carrier airplanes in sequence; and (4) the captain's previous experience operating successfully at Denver under wind shear conditions.

Application to MAC

The crew of UA 663 was indeed fortunate to have come away with relatively minor aircraft damage following their encounter with severe wind shear. Current technology makes wind-shear forecasting extremely difficult. The FAA is continuing to study this phenomenon in an attempt to increase the reliablity of wind shear forecasting. The loss of aircraft and lives continues to make this subject one of the "hotter" safety items in MAC and the entire aviation community. Until a more reliable means of forecasting wind shear is developed, it behooves each of us, as MAC crewmembers, to know the warning signs of a possible wind shear and avoid areas where a combination of these indicators is present. Sometimes, what you can't see can be deadly.

Adapted from NTSB/AAR-85/05

What the Heck is *TMF*?

About once a year, or more often if we feel there's a need, we like to sit down, resurrect *The MAC Flyer's* mandate and review some of its more significant aspects with you. So, here goes.

The pubs folks call us MACRP 127-5 which means we are a MAC Recurring Publication. *TMF* is, by a mandate set forth over 31 years ago, the command's "primary medium for conveying professional, educational flight safety material" to every one of you. We aim the bulk of our articles at crewmembers and direct support people. So, our policy is to limit the contents of the magazine almost exclusively to flight safety-related topics.

We've been a flight safety publication from the very beginning, so for that reason we're in the MAC Inspector General's chain of command. We're *not* a public affairs pub; never have been. Consequently, our articles are about flight safety topics—how crewmembers overcame a critical emergency; human factors or materiel failures; professional readings. We keep pure press releases out of our pages as feature articles. We do use examples of people who "done good" to emphasize pertinent safety points. Our aim is not to make public jackanapes out of anyone, but simply to give you the opportunity to learn from others' mistakes and kudos.

We certainly don't limit our scope to purely military material, either. For obvious reasons, the cross-tell value of commercial incidents is extremely useful to all of us. Besides, it isn't protected under AFR 127-4, and is readily available much sooner for publication and mishap prevention purposes. This cross-tell is widely practiced among flight safety periodicals to the benefit of all.

You may have wondered why so much time passes between a major mishap and its coverage in the magazine. Well, there are two factors which influence timeliness. First, safety investigation boards work slowly and deliberately, and it takes time for their official determination to become public. Second, other than our "After Deadlines," everything printed in *TMF* is scheduled at least *three months* ahead of the cover date.

Most of the time, we're able to disguise military mishaps so even the principal players have difficulty recognizing their own mishaps. Again, we aren't out to purposely embarrass people or ruin careers. What's important is telling *what* happened and *how* it can be prevented. Furthermore, AFR 127-4 suggests sanitizing mishap reports for publication in order to protect the "privileged'" status of those documents. We don't need someone using a safety education article as "Exhibit One" in a lawsuit. Other documents, such as NTSB reports, are covered by a different set of rules.

Finally, *TMF* is *not* a policy-making vehicle, nor is it directive in nature. We promote flight safety by providing a forum devoted to bringing to your attention a wide variety of mishaps from which you can learn a lesson or two. We also try to offer suggestions which we hope will prevent future disasters. *That's* what *TMF* is all about!

CRAF Our Partners in Airlift

EASTERN

The latest aircraft to join the Civil Reserve Air Fleet (CRAF) is the Boeing 757-200. Because of its range, it belongs to the short-range international segment of the CRAF. This segment contains both B-757 and B-727 aircraft with a 1500 NM range to accommodate short-haul operations from the CONUS to near offshore locations such as Greenland, Iceland, and the Caribbean.

The B-757 advanced technology combines low noise, high-bypass ratio engines with lighter weight through improved metal alloys to produce the most fuel efficient aircraft in production today. A modernized flight deck contains advanced technology avionics and an optimized design for a two-crew operation. The flight management system provides automatic flight capability from just after takeoff through landing and rollout. A high degree of commonality with the 767 flight deck (59.7 percent) allows flexibility in flight crew transition and benefits in training. Its

185 seats represent a 25-32 percent increase over the B-727 which is approximately the same length.

Currently, the short-range international segment of the CRAF includes six B-757s furnished by Eastern Airlines. This segment provides us with flexibility during contingencies to support near offshore requirements without using critical assets dedicated to the long-range international segment. This support demonstrates our continuing "partnership" with the CRAF in providing airlift for the nation.

Boeing 757/200 Specifications:

Length	155 ft 3 in
Wing Span	124 ft 6 in
Height	44 ft 6 in
Maximum Takeoff Weight	220,000 lbs
Maximum Passengers	185
Cruise Speed	585 MPH
Range	1660 NM

What you've always wanted to say . . .

Reports from NASA's

CALLBACK

(Editor's Note—The National Aeronautics and Space Administration has, for some six years now, operated the Aviation Safety Reporting System (ASRS). This anonymous reporting system relies on inputs from commercial, private and military crewmembers as a means of "getting the word out" about their misadventures. Some are downright stupid; some are funny; some are absolutely death-defying. But the very fact that people will take the time to write down their experiences serves as a basis for us to say, "There but for the grace . . . ." We're presenting a few of those we believe relate to how and what we fly.)

Good Grief, #19

• On this morning, I arrived at the airport before daybreak. My copilot was in the hangar preflighting the aircraft. Preflight was completed under the hangar lights and the aircraft was towed out onto the ramp. It was dark and the sky was overcast. My copilot disconnected the tug while I closed the hangar doors. We received our clearance over the landline, with a release time and a void time only five minutes apart. The aircraft was situated on the ramp so we approached it from behind. I didn't know—and I didn't ask—if the tow bar was disconnected. I failed to do a final walk-around because of the pressing time to release. While taxiing, I noticed a slight vibration in the rudder pedals and asked my copilot to taxi and see if he felt anything. It felt all right to him; I hadn't flown this aircraft in several weeks and at this point thought the vibration was insignificant. I did not want to lose our release time by shutting down and inspecting the nosegear. We launched with three minutes to spare. The aircraft tracked smoothly with no vibration in the pedals. We rotated, got the gear up and completed the after-takeoff checklist. We had no indication that anything else was wrong; the gear came up smoothly and we had no warning lights. The gear was cycled four times as we tried to get into our destination airport, but we were unable to land because of ground fog. Each time, the gear went down and came up smoothly. We had no idea the towbar was still attached to the nosewheel. We diverted to our alternate and initiated the ILS. Upon lowering the gear in a shallow turn, I felt a slight nose-right yaw which was easily corrected. I made a smooth nose-high landing. After clearing the runway, the driver of a ground vehicle came on the frequency and said we had a tow bar attached to our nosewheel. As a team, there must always be an avenue of communication,

not just in the cockpit, but during all phases of the operation.

NASA must've thought the same thing. That's why they printed it in *CALLBACK* Number 62.

Flag Burning

This report, from one of the military flying organizations, involves a military version of a popular civilian airliner; it has a lesson for operators of all aircraft.

• Following a routine transport flight, the crew chief exited the aircraft and inserted the landing gear pins. He returned to the cockpit and turned on all the exterior lights for a visual inspection as required by procedures. He then proceeded from the cockpit down the forward ladder to complete his post-flight inspection. As he approached the nose of the aircraft, he noticed smoke in the nosewheel area. Closer inspection revealed that the nosegear pin warning flag was hanging across the front of one of the nosegear landing lights. He immediately instructed the maintenance personnel in the cockpit to extinguish the lights. The lights were turned off without delay; however, the flag spontaneously burst into flames. The crew chief quickly removed the burning flag from the nosewheel area . . .

Corrective actions: Replace landing gear pin warning flags at regular intervals to eliminate unnecessary hazards like oil and fuel absorption. Ensure the warning flag is positioned behind the landing light. A recommended change to the manual is in progress, adding a warning about the potential hazard of spontaneous combustion when warning flags are exposed to the heat emitted by the nosegear landing lights.

Comments: The disaster potential of this incident is frightening. If the crew chief hadn't been so alert . . . . Fortunately, this incident has been a vivid learning experience.

Mystery!

The following report, reprinted in its entirety, was recently received by ASRS. If the person who wrote it reads it, please fill out another ASRS form with more detail.

• **I am not going to fly anymore!**

Cost of Flying

The English operate a Confidential Incident Reporting Program modeled closely on ASRS. Their equivalent to *CALLBACK* is called *FEEDBACK* and contains, as you might suppose, material much like that found in the NASA publication, with due allowance for language and geographic differences. Now and then *FEEDBACK* borrows from *CALLBACK* and vice versa. Here, with grateful acknowledgement, is a versa.

• . . . Controller asked widebody for an orbit. The captain (aircraft commander) replied, "Do you realize it costs $500 every time we turn this aircraft through 180 degrees?" The unperturbed controller simply responded, "Well, give me a $1,000 turn then!"

Take Off When Ready—Or Sooner!

Sometimes trouble isn't recognized until it has passed. Three crewmembers, each intent on their own responsibilities, were led astray by an improbable chain of "gotchas" and only good fortune averted a serious occurrence. Although each filed a report, here are the words of the aircraft commander. Remember, too, that even though this incident happened on a snow-covered runway, MAC's operations take it from balmy breezes to barren wastelands in just a few hours.

• It was snowing for our departure. The runway was covered with snow. The parking brake was set while waiting for takeoff clearance. With tower clearance, engine power was advanced with the brakes set. This was to ensure anti-ice and even spool-up. Near 90% N_1, the aircraft lurched forward as when brakes are released at a high power setting. Performance was normal for takeoff on a snow-covered runway. On climbout at 500 feet, the copilot pointed at the red parking brake light. It was *on* and the lever was *back*! The copilot was flying and he said that at the time of the lurch, he thought the aircraft commander had released the parking brake; the AC, on the other hand, thought the copilot (he was flying the machine) had released the brake. On landing, all main gear tires were flat!

Sometimes it's a Matter of . . . Safety of Flight

by Captain James W. Stoddard
Det 4, 1401 MAS
Peterson AFB, Colorado

"Gear up."

"Gear up," the copilot replied, and that was when I noticed that both engines had flamed out. I fire-walled the two remaining engines, but the heavy C-141 was slow to respond.

"Pull up, whoop, whoop, pull up!" The radar altimeter showed 300 feet . . . 200 feet . . . 100 feet . . . 50 feet . . .

Ring! Ring!

I awoke from a restless night with a start, bathed in sweat. It was 0315.

Ring! Ring! The phone! My alert?

"Hello?"

"Captain Stoddard?"

"Yes."

"This is the squadron. You're alerted for a 0415 show."

"Okay. Thanks a lot."

It was the alert for the Bright Star exercise. I was glad I wasn't flying to Rhein-Main AB, Germany. Luckily, our crew was deadheading. I felt as if I hadn't slept all night. I tried going to bed at 2100, but only tossed and turned. The last time I looked at the clock it was 2345.

When I arrived at the squadron, it was a mad house. The Starlifter was to transport four complete crews—and cargo to boot! It was going to be a long ten hours. Now I knew how it felt to be on a C-5 crew. My crew felt the same. We would all be glad when we got to the stage location and settled down to the "solo crew" routine. We wanted to stay out in the system as long as possible.

"Captain, wake up."

"What?"

"We've started our descent, block time is 2315Z, you'll have to fasten your seatbelt."

"Oh, yeah. Thanks."

Well, I mused, that wasn't a restful sleep either. But you get used to it, or almost used to it. The early morning alerts after two and a half years are expected, but still hard to cope with.

The old familiar post-flight routine was, well, routine, except for the three additional aircrews on the bus. The stop at command post for post/pre-mission crew rest quotas and the expected route for the next day's mission, the stop at the billeting office for room assignments, and the stop at the bar for a few cold ones were all too familiar.

"Gear up."

"Gear up," the copilot replied.

It was 1800 local, Germany time. All engine instruments were normal. My mind wandered back to the morning I was alerted. When was it? The days seemed to run together. But this takeoff was normal. I had done it many times before, but this time we were going to a new destination—Cairo West, Egypt, a destination with very few navaids, air traffic control assistance, or visual cues. And it was an exercise. Mostly trash hauling with a few duty passengers going to that airfield. I was glad I wasn't going to be there long.

This exercise seemed to be different. Our staging base was Rhein-Main and the normal mission profile was to transport cargo to Cairo West and return. The mission usually pushed our basic crew duty day of 16 hours to the limit. They must have had a shortage of crews because we only had minimum crew rest before we were launched again. My crew was now having second thoughts about staying out as long as possible and, to tell the truth, so was I. We were *tired*.

What started out as new and novel became tedious. It seemed our crew was locked into the early morning alert shift and nobody seemed to get enough rest on such strange hours. But hey! We're MAC. When the "going got tough, the tough got going,"

Honorable Mention 1985 Flight Safety Writing Contest

and we remained mission oriented and professional throughout each of the grueling trips back and forth to Cairo West. How I wished we had an augmented crew! I never thought I would wish for it, since augmented crews tend to be too large, but at least one pilot could have slept in the bunk.

"Pilot, engineer."

My head whiplashed against the back of my seat. The copilot's head was propped against his backrest, mouth wide open, snoring deeply. I had given him permission to sleep for awhile. This was my airplane. I would fly it. We had started our mission a little over 14 hours ago.

"Pilot, engineer."

"Go ahead, engineer." I noticed the ragged look on the sergeant's face.

"Missed a radio call."

"Oh," I murmured. I looked at my watch. Good, I had only slept about five minutes. I wouldn't let myself do that again. I adjusted the air outlet, directing a cold blast of air on my face and crisply verified our altitude with the ATC controller. I remembered a previous squadron safety meeting where they discussed the dangers of fatigue, ". . . crews are more able to cope with normal operations and significantly more apt to correctly analyze potentially life threatening emergencies when they are well rested rather than fatigued . . . ."

Great, I thought. A C-141 crew goes on a mission and more times than not, it spells *fatigue*, through no fault of their own. It's the nature of the mission. But my guard was up. When you're tired, you make mistakes. I began to double check everything I did.

Back at Rhein-Main after our post-mission crew rest, we were put on Bravo Alert starting at 0700. Well, at least we had a break from the Cairo run for awhile. All of us had had a fairly good rest except for an inability to sleep past 0600. Call it jet lag or the strange alert times we had had the past several days, but we all woke early. We had faith we wouldn't be launched. After all, how often had we launched on Bravo before? Not often, but I tried to take a nap in the afternoon anyway. I couldn't sleep. I watched TV, tried to relax, but nothing seemed to work. Oh well, I reasoned, I'll get some dinner, watch a little more TV and then I'll be ready for bed. I met the rest of the crew in the cafeteria. It turned out they were in the same shape I was. And that was when the call came.

"Captain Stoddard?"

"Yes."

"This is command post. We have to alert you for a 2300 show." I glanced at my watch. It was 2200.

"Let me guess. We're going to Cairo West again. Right?"

"Yeah, that's right. See you in an hour."

I told my crew the news. They were not pleased. We all agreed that after this run we would request to be sent home.

As the overpowered engines of the Starlifter roared to life, a nagging question ran through my mind. Were we really able to handle this mission safely? Well, we were legal. Weren't we? I mean, we had our pre- and post-mission crew rest periods. We never exceeded our crew day. And our job was to complete the missions handed to us. How could we turn down a mission in an exercise that was considered quite important? Press on, I thought.

This mission proceeded smoothly. I don't feel *that* tired, I thought. The trip back will be a little more talkative. But the trip back was just as silent. The ground time at Cairo West was fairly short and the unloading operations went off without a hitch, although we were making little mistakes. I was making mistakes. We were passing 5,000 feet before I noticed the red anti-skid off light. I thought it strange no one else caught it. Aircrew checklist discipline was going down the tubes because of fatigue. It was scary. As the aircraft commander, I needed to pull everyone back together. I emphasized our fatigued condition and reminded everybody of their responsibility to watch over everyone else, especially the pilots, and call attention to *anything* out of the ordinary, immediately.

"Descent check."

The engineer rattled off the required checklist items and received all the proper responses. My frank talk to the crew had its intended effect.

As the copilot contacted Rhein-Main approach control I realized how tired I actually was. It seemed as though I was no longer in my own body. I was looking at myself flying and it was one of the most terrifying experiences in my flying career.

"Bob, can you take this approach?"

"I'd rather not, I don't think that I can do it."

I said nothing. I tried to suppress the panic that was building inside of me. I no longer felt in control. And now I knew the rest of the crew was feeling the cumulative effects of the past two weeks as much as I did. I was the aircraft commander. I was responsible. I had to concentrate. A growing fuzziness continued to envelop me.

"Bob. You *have* to help me."

All of us were in this together. I had to concentrate. I had to have some help.

"Bob, you control the throttles and I'll take the yoke. Can you handle it?" Bob nodded in agreement.

Numbness replaced the fuzziness I felt before. But more than ever I was determined to get the crew and airplane safely on the ground.

"Current weather 1,000 overcast, 3 miles visibility, winds 210 at 10 knots. Cleared to land."

Distantly I heard the copilot acknowledge "gear down." I didn't remember calling for the gear, but it was down.

"Flaps, landing."

"Flaps, landing."

Glide path intercept. It won't be long now. I have to concentrate. Bob's got the throttles. Airspeed's good, on glide path. I readjusted the eyeball air outlet on my face. Have to concentrate. Five hundred feet to go. Stay on glide path.

"Runway's in sight, boss."

Concentrate. Airspeed's good.

"Land."

I felt the satisfying compression of the landing gear struts.

"Spoilers."

I felt as if someone else was landing the airplane.

"60 knots."

Safe. On centerline. I looked at my copilot.

"We did it."

His face appeared to have aged ten years. He nodded once. The crew started talking again. It was early afternoon.

Command post wanted us in minimum crew rest and then launch to Cairo West early the next morning. . . again. I did something I had never done before. I uttered those three magic words that were quite necessary at the time. "Safety of flight." I told command post of the grueling past two weeks and told them after 16 hours they could alert us to go home. They agreed.

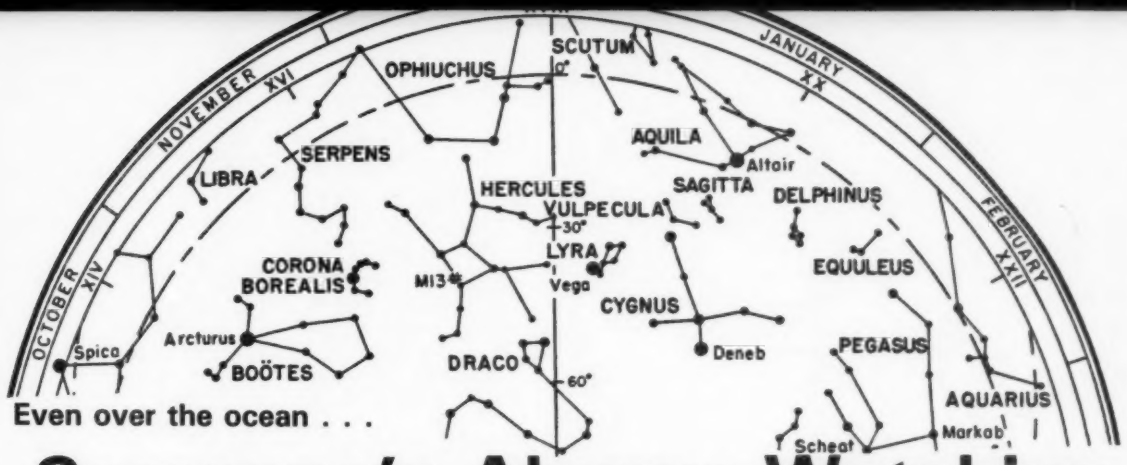
Back in my room, I had time for one beer and then bed. 15 hours later, I woke to a knock at the door. I was still in my flight suit. We were alerted to go home.

Awake and refreshed, my crew showed up at command post. I had lived to learn a valuable lesson. Being legal to do a mission doesn't make it necessarily right. Like the regulations say about a mission clearance decision . . . .

"The decision to delay a mission may be made by the controlling agency or the aircraft commander when, in the opinion of either, conditions are not safe to start/continue a mission. Final responsibility for the safe conduct of the mission rests with the aircraft commander."

When we rode out to our airlifter with another crew, we were shocked to find out that a C-141 had crashed at Cairo West just that morning. We all looked at each other, but said nothing. It could have been us.

Capt. Stoddard was commissioned after graduating from the University of Southern California in June 1975. Following commissioning, he earned his Masters, again from USC, in Safety and Systems Management. He completed UPT at Reese AFB, Texas, then moved on to the 76 MAS at Charleston AFB, SC, flying C-141s. While at Charleston, he served as the squadron safety officer and the wing simulator instructor. Captain Stoddard came to the 1401 MAS in March, 1982, flew the CT-39, and now flies the C-21. He serves as the Chief, Aircrew Scheduler and as the Assistant Chief, Standardization/Evaluation.



Even over the ocean . . .

Someone's Always Watching

by Mr G. Brett
IFALPA Membership and Regional Secretary

(Editor's Note--Navigation has become a relatively simple chore for those of us with the reliable INS aboard, and unfortunately, the resulting tendency to *assume* all is well with course guidance is strong. The following article highlights some of the errors we humans inadvertently introduce into an otherwise reliable navigation system.)

Minimum Navigation Performance Specifications (MNPS) have been applied to aircraft operating in a defined portion of North Atlantic airspace since 1977. Arrival radar controllers maintain continuous monitoring of the navigation accuracy of aircraft using MNPS airspace to confirm the required navigational standard is maintained. ATC divides the data collected by radar stations for use in the monitoring process into two categories—deviations of 25 nm or more, and deviations of less than 25 nm. When ATC detects a deviation from track of 25 nm or more by a flight, the appropriate authority from the country which collects the data investigates the causes for the deviation in cooperation with the operator and, where appropriate, with the authorities of the country having jurisdiction over the aircraft operator .

Implied in the MNPS concept is the understanding that all operations in MNPS airspace--whether public transport or general aviation—are of the highest standards, and that operators and crews are fully aware of the inherent obligations of MNPS.

The disturbing facet of the errors reported since 1 March 1984 is that the great majority of errors having a magnitude of 50 - 70 nm appear to have been due to incorrect waypoint insertion or ATC system loop errors. (By definition, an ATC system loop error is any error caused by a misunderstanding between the pilot and the controller regarding the assigned flight level, Mach number or route to be followed).

Navigation systems are now so reliable that a typical crewmember could theoretically fly across the Atlantic throughout his entire career without ever being more than five miles from cleared track. Not surprisingly, this may eventually lead to overconfidence. So, in order to guard against complacency, the latest edition of the North Atlantic MNPS Airspace Operations Manual includes the following material:

CAUSES OF ERRORS

To begin with, and to illustrate the types of things which *can* go wrong, here are some examples of surprising problems we've seen:

- The LAT/LONG coordinates displayed near the gate position at one international airport were wrong.
- On one aircraft, even though the forward latitude was correctly inserted by the crew (51°), because of a defeative chip in one of the INS systems, it subsequently "jumped" by one degree to 52°.
- The aircraft was equipped with an advanced system with all the coordinates for their cleared track; unfortunately, the data from the company flight plan which the

crew inserted into the navigation computer contained an error which went undetected.

MOST COMMON CAUSE OF ERRORS

The most common cause of gross errors, in approximate order of frequency, were as as follows:

- A mistake of one degree of latitude when inserting a forward waypoint. There seems to be a greater tendency for this error when a track, after following the same latitude for several waypoints (e.g. 57°N 50°W; 57°N40°W; 57°N30°W), suddenly changes by one degree (e.g. 56°N20°W).
- Crews receiving additional, unsolicited clearance from ATC, or asking for and obtaining a clearance, then forgetting to reprogram the INS.
- The autopilot inadvertently left in the heading or decoupled position after avoiding weather, or left in the VOR position after leaving the last domestic airspace VOR. In some cases the mistake arose during a distraction caused by some flight deck warning system.
- Errors also arise in the ATC loop, so that the controller and the crew have different understandings of the clearance. In some cases, the pilot has heard not what was said, but what he wanted to hear said.

LESSONS TO BE LEARNED

- Never relax or be casual regarding your cross-check procedures. This is especially important toward the end of a long night flight.
- Avoid casual radio procedures. A number of gross errors resulted from misunderstandings between the pilot and controller as to the cleared route. Adhere strictly to proper phraseology and don't be tempted to abbreviate details of waypoint coordinates.
- Make an independant check on the parking position. Don't assume the parking spot coordinates are correct without cross-checking with an authoritative source. Normally, of course, you expect coordinates to be to the nearest tenth of a minute, so make sure that the display is not to the nearest hundredth, or in minutes and seconds. And, if you are near the prime meridian, remember the risk of confusing east and west.
- Before entering oceanic airspace make a careful check of the INS position at or near the last radio facility—or perhaps the one before last.
- Do not assume that you are at a waypoint just because the alert annunciator indicates so; cross-check by reading present position.
- Flight deck drills. There are some tasks on the flight deck which can be safely delegated to a single member of the crew, but navigation using automated systems is emphatically *not* one of them, and the aircraft commander should participate in all navigation cross-check procedures.
- Initialization errors. Always return to the ramp and reinitialize the INS if the aircraft is moved before the INS NAV mode is selected.
- Waypoint loading. Before departure, check that the following agree: computer flight plan, ICAO flight plan, track plotted on chart, and if appropriate, track message. In flight, involve two different sources in the cross-checking, if possible. Do not be so hurried in loading waypoints that mistakes become likely, and always check waypoints against the current ATC clearance.
- Use a pilot-chart on the flight deck. We've found that making periodic plots of position on a suitable chart and comparing it with current cleared track helps tremendously in picking up errors—before getting too far from track.
- Always remember that something absurd may have happened in the last half hour. There are often ways you can maintain an awareness of overall progress. You can use the position of the sun or stars; disposition of contrails; islands or coastlines observed directly or on radar; radio navaids and so forth. This is obvious stuff, but some of the errors could have been prevented if the crew had shown more of this type of common sense alertness.
- If you suspect that equipment failure may be leading to divergence from cleared track, it is better to advise ATC early rather than late. Bad news doesn't improve with age.

Finally, spare a thought for the gross navigation errors that occur in airspace which is *not* monitored—and make sure it doesn't happen to you!

Courtesy Flight Safety Review

C.R. Terror

The Marginal Mission Commander makes a mistake.

"Crew, nav. Thirty seconds to stations," Blinky dutifully informed the complement.

"Clear number three, Ty, and keep it cleared." The Turboprop Titan wanted to make a good impression on the new Vice Wing Commander, Col. Ofersear, who just *happened* to be in the aircraft parked next to C.R. and crew. "These formation flights offer a perfect opportunity to display our predilection for punctuality. Besides, I hear there's a possibility my OER might actually be forwarded as far as the CV's desk this time! We'd certainly want him to see the *real* me, right m'lads?"

Sam, Blinky, Max and Ty sighed in unison, sensing the approach of another of the Magnificent Major's self-initiated air shows.

"Boss, this is stations, engine start comes later." Sam was pretty used to this by now.

"I knew that. Just checking to see if everyone was up to speed here today. Let's see, there's something we're supposed to . . ."

"Hacky 90 flight, check-in." Sam began the ordeal.

"Two."

"Three."

"Five."

"Six."

"Well, that went real smooth, I'd say," the Demon of Detail remarked.

"Nine-zero lead, four."

"Go ahead four."

"Our SKE equipment seems to be inoperative. We're going to have maintenance check it out and try to make taxi.

"Roger." The Mischosen Mission Commander had already begun to sweat. "I wonder what it could be? Perhaps the R/T is out, or maybe they're on the wrong frequency, or maybe they need a master change or . . ."

"Boss, I think they've got a handle on those possibilities too, they've got the same flimsy we've got."

"Sammy m'lad, when you're the mission commander, you've got to command and control. You need to check *everything*. Lead, four, er, ah, four, lead. You might want to check your freq, we're on 'A', check your lights, we'll perform a master change here in a minute and . . .

"Aircraft transmitting on tower, check your wafer switch!" the ground controller shot back.

"Right you are, sir. Sammy, call four and pass the words I just gave you."

"Four, lead. How's the problem coming?" Long Suffering Sam was an expert in translating "Terrorese" into real words.

"The SKE is definitely out, and it'll be over two hours 'til we can get the part. What's the verdict there, Mike Charlie?"

After a few moments of uncomfortable silence, with the usual ensuing radio checks, Sammy gently prodded the Marvelous Manager to thought. "Boss, they need an answer."

"We'll cancel the mission! Brief the plan and fly the brief, I always say. We briefed a six ship, and we just can't make it. We'll try again tomorrow. No loss if we post-pone this mission for twenty .

"The first four hours will

be taken up by the three vis routes and vis recoveries Boss," Blinky interrupted the soliloquy. "They could just break off after that and get their maintenance done."

"Or," Max tossed in, "They could stay until the vis is over, then fly pilot pro. That bird isn't flying tomorrow anyway."

"Gentlemen, gentlemen, not all at once. Haven't you heard of task saturation? I'm trying to come to a reasonable decision, with my entire career in the balance," MAC's Most Senior Major pleaded. "Sammy, ask four if their vis equipment is operational."

"They've, er, already said it's okay." L.S. realized that under strain, it was best to let him work these details out in his own mind.

"Right. *Tell* them they're to stay with us until the vis portion is over, then they can break off as needed. No sense holding up the formation worrying about that equipment now, anyway." C.R. was finally taking charge.

"Lead, four. How about we just hang in for the vis portion and break off after the third route?"

"Approved." Sammy wondered if they'd ever get their leader to decide something *before* it was history.

"I'd say start and taxi went without a hitch there, eh, Sammy? Well, except for us cocking the opposite direction for engine run-up, thereby fodding out four F-15 engines. Besides, I always turn off ground to monitor interplane during run-ups, but that could have happened to anybody. Call tower for clearance. Your take-off."

A little color was returning to Sammy's ashen face as he called for clearance onto the runway.

Take off was normal for the entire formation, due in no small part to the Magnanimous Major relinquishing control to Long Suffering Sam for his quarterly night takeoff.

"Not bad, Sammy m'lad, but you're thirty feet off your altitude, have been the whole SID," C.R. called, not realizing the difference between their altimeters. "It's attention to detail that makes all the difference, comes with experience," the Terrorific Teacher intoned.

"Right Boss, your aircraft."

"Now watch closely, Sammy, and you'll see what this tactical stuff is *really* all about. Clear the formation to fluid trail and 300 feet, so we can start the real yankin' and bankin'," the Low-level Lothario was entranced.

"Crew, nav. We're six miles from our check point. We're looking for a river bend. It will . . ."

"Not now, Blinky ol' boy, we're about to go trail. Can't be bothered with that rigid stuff, this here's real flying," the Oversized Orator overreacted.

"But Boss, we're now only three miles from the turn point, even in fluid trail you need the base headings, and knowing your position is even more important," Blinky pleaded. "Now, we're looking for a 'U' shaped bend with the bottom of the 'U' facing to our . . ."

"Blinky m'lad, try to keep it short. What if Colonel Ofersear wants to know more about how I keep such a

superb contouring flight profile? Look here . . ." and the Technique Teaching Tellurian thrust a crusty black binder at the hapless nav, dislodging a clipboard, with charts in three scales, a CARP card and a DZ photo, disconnecting the boom mic from Blinky's headset, and launching an unknown number of stapled inserts into the air.

"There's the turn point. The next heading is 030°," Blinky shouted at the copilot. L.S. Sam quickly "accepted" aircraft control, acknowledged the turn point briefing and capably kept the craft on course. These types of nonstandard "procedures" weren't at all unusual during these periods of aerial demonstration.

"Don't worry, Boss," Sam offered, "I'll monitor interplane and let you know if Colonel Ofersear has any questions. This way you can concentrate on command and control, especially control."

"Good idea, Sammy m'lad. It's about time to show you a little real world map reading, anyway. Let's see, we're

going to Rowdy drop zone on the night six route , got it right here," and the Terrible Topographer pulled out a faded Texaco map of the midwest, complete with circles, arrows, and labeled: *Lt.* C.R. Terror, Master of the Magnificent. It was *old.*

"Boss, we're flying to Whiskey range Charlie drop zone using the chart we studied last night," Blinky said as he collected his thoughts as well as his navigation paraphernalia. He was now using the right side of the aircraft for map reading. "We don't use charts more than once anymore, remember? This is a new route and doesn't have a name. Sammy and I drew up a copy for you. Here, this might help," said Blinky, handing the Visual Virtuoso a crisp, clean chart with a single flawless route delicately inscribed in grease pencil.

"Now, shouldn't we be getting the twenty-minute warning?"

"That was fifteen minutes ago, Boss. We're waiting on slowdown now," Ty pointed out quickly.

"Er, ah, right, of course. How are we doing there Blinky, m'lad?"

"Crew, nav. Thirty seconds to slowdown, five seconds to slowdown, slow down, now." The standard phrases flowed smoothly.

"Don't forget to flash the lights there Sammy m'lad. It's those fine points that really impress 'em." The crew was noticeably quiet, not wanting to disturb the eerie aura of efficiency in which they now basked. "You can fly this run-in and drop Sammy. I've certainly had enough practice. Why, I bet I've got more time inside the five second warning than you've got in the airplane," the King of Cliches commented.

"Okay, Boss. Navigator, copilot, could you run down the drop information one more time for me?"

"Affirmative, co. We're lined up real well and flying a drift-killed heading, so just hold what you've got for now. We're looking for 1,150 feet on the altimeter . . ."

"Don't forget to add fifty feet, we're two elements," the Ace of Airdrop added.

"Boss, this is a *vis* drop. The airspeed should be 130 knots, copilot," Blinky continued.

"I think we want 125 knots there, nav," C.R. interjected.

"Boss, this is a heavy equipment drop. We want to remain 150 yards right of centerline and the five second warning will fall right at the timing lights." Blinky was in drop mode now and the tension mounted as they drew nearer the CARP.

"Keep right on me, nav. We want to do this one right, I don't get to fly *that* many of them, you know." Sammy was genuinely surprised that the experienced AC would let him take the drop on such an important flight.

"Crew, nav, one-minute warning."

"One minute warning acknowledged, loadmaster. One minute checks complete, loadmaster." Ty was good at completing the checklists quickly. But flying with C.R., he had to be.

"Crew, navigator. Five seconds . . . . *Green light.*" The light illuminated, but then—nothing.

"The *button* Boss, the ADS button."

"What, who, what, where, oh, that's right, here you go."

"Red light!" Blinky was worried, again.

"Load Clear. It seemed to go out pretty fast, nav." Ty tried to console the now-weeping navigator, but to no avail.

"Hack Nine-zero, Tailpipe Charlie. Strike report," the voice of the CCT crackled:

"Go ahead, Tailpipe Charlie," a despondent Sam tried to hold his voice in check.

"Roger, Nine zero lead, parachute malfunctioned, but no problem, the load impacted at 77 yards at 12. Nine zero two, three, four and five, P. I. Outstanding formation drop, sir. One-of-a-kind"

"That's it! I've done, er we've done it, m'lads. No way the good colonel will pass up my OER this time. I think I'll check in with him and get his in-flight reaction to this formation flight." The Magnificent Mission Commander was beside himself!"

"Hacky Nine-Zero, Command Post."

"Go ahead, dispenser of fine command and control directives from our superiorly superb wing leadership," C.R. was above blatant public servility.

"Roger Nine-Zero, Colonel Ofersear advises he'll meet you out in front of base ops after the third route, so plan your scenario accordingly."

The intense silence in the cockpit was broken only by the peals of hysterical laughter from Sam, Blinky Max and Ty.

Quick Stoppers

Corridor Cop Out

Corridor flights are never *that* much fun. They even have a chapter in the MACR 55-XXX series detailing the specific quantities of fun allowed on these missions. Hence the crew of this C-12F was carefully monitoring their fun meters during this short flight when, WHAM! The old fun meter pegged off scale high. Right along with it went the right engine oil pressure guage. Reacting swiftly, as all steely-eyed C-12 aviators do, they retarded the number-two throttle. The oil pressure stabilized at 125 PSI, just long enough for nerves to settle and palpitations to subside, then back up to 200 PSI. Even though all other engine parameters read normal-normal, the crew wisely opted to shut down the offending engine. After an uneventful emergency landing, the maintainers gave the aircraft a close look. They discovered the right oil pressure transducer had failed, precipitating the single engine surly-slipping opportunity.

A Total Cross Body Block

Armed only with their landing lights, 130 knots of airspeed and several thousand pounds of aircraft, the crew began the final approach. Opposing them was an incredibly optimistic linebacker of the feathered variety. The gallant C-141 crew decided to make the approach into the dreaded Midway NAS anyway. They were aware of the "bird problem" on the island, as are most breathing souls who've ever flown in that neck of the woods. In fact, the place is famous for the infamous "Gooney Bird," or Black-Footed Albatross. Some argue they aren't birds, but actually mutant cows which fly—after a fashion.

Large though it may have been, its finely muscled bulk was no match for the aluminum vessel, and it suffered an instantaneous fate in the number-one engine. So, the contest will be recorded as a victory for the aircraft, minus a few points for the loss of the $16,970 worth of number-one engine.

Inadvertent Insecurity

You'd think sitting behind the operator end of a M-60 machine gun would give even the most skittish of crewmembers all the security they could desire, but not always. On this particular clear spring morning, whilst sitting back comfortably and firing said awesome weapon aboard the equally awesome UH-60 weapon system, this gunner's restraint system "auto-released." The combat-ready crewmember continued firing the gun without hesitation. His heroic stoicism lost some of its priority when an astonished fellow crewmember mentioned that the buckle had unfastened. The now-insecure gunner wisely lost little time in correcting the malady.

Seems the culprit is a buckle assembly which can be released by simple contact with a solid object, in this case the lower window frame. A fix for the buckle is in the works, and until the problem is solved an alternative harness is being used. Best to leave the tie that binds bound.

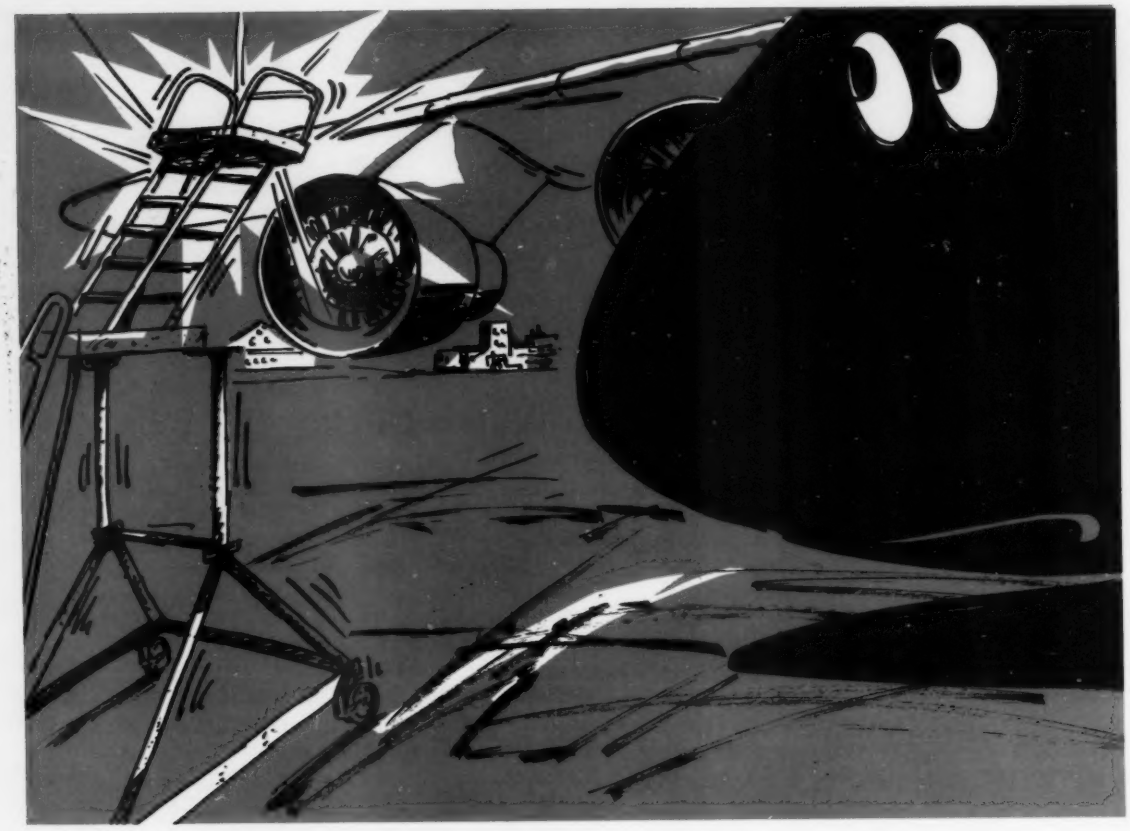
Watch Out for the Bul ...

Just another superb takeoff, and this crew was on its way to another fine five-hour local when suddenly it happened. There, at 12:00 and 3:00 and 9:00—in fact, all over the horizon it seemed—were the beasts from the trees. At 110 KIAS, 70 feet AGL and armed only with their landing lights (pretty effective in the bright daylight), this unfortunate crew had unleashed the wrath of a flock of birds. Immediately after the impact(s) the aircraft commander shutdown the number-two engine for high TIT and low RPM, then brought it around for a full stop and casualty assessment.

The dreaded Brown Eared Bul Buls had attacked again, thinking they had claimed yet another victim in the form of a number-two engine.

But ho! Such was not the case this time, the engine checked out fine. Although there were fifteen verifiable impacts on or near the number-two engine, and more than fifty birds in a now permanently stablé condition, neither the crew nor maintainers could find any other damage to the aircraft. Detailed investigation revealed this particular brand of fowl bands together in flocks only during the late summer, when other bird flocks are large with many offspring to ease the food hunting process. Though not normally found near this base, they were definitely there this time, and could have had disastrous effects on our Lockheed heroes. Yet another reason to be cautious when the Bul starts flying.

Quick Stoppers



Slat Slappin'

When you're working on the free world's largest aircraft, it stands to reason you're going to need some help in reaching certain parts. The mainstay of the maintenance elevation force, the B-2 stand, was once more called to duty in the repair of this C-5's visor. In fact, two B-2 stands were needed to effect the repair of the visor, and once the crew chiefs completed the work, said stands were moved beyond the "circle of safety." Thinking the stands might be used again, the crew chief didn't call to have them towed away or move them beyond the wing outboard of the jet exhaust area, as the local MOI directs. They did, however, lock at least one wheel on each of the stands.

Luck wasn't one of their strong suits that day, what with the winds gusting to 22 knots and all. But weather problems weren't enough to ruin their otherwise peaceful day. They needed something more to "lift" their spirits. Obligingly, a nearby flying machine of similar statuesque proportions began to block out of parking. The crew chief in the cockpit noticed one of the two B-2 stands rocking from the combined wind and jet exhaust, but as she was halfway down the ladder enroute to solve the problem permanently, she heard the radio call indicating she was too late. The *other* B-2 couldn't stand the wait, and launched itself into the number-five right wing leading edge slat to the tune of $5,500 in cold hard cash.

After Deadlines

C-5A LIFESPAN SECURITY—With all the news centering around the Air Force's newest Galaxy, one might wonder what we did, or are doing with the C-5A. Well, the original version of the free world's largest aircraft is still very much alive and well. In fact, the Air Force Logistics Command has announced a program designed to ensure C-5A longevity called Pacer GALAXY. The basis for the program is an effort to update the C-5A, using the avionics and landing gear technology developed for the C-5B. The Air Force will save time and money by consolidating all needed updates into one program. As with anything dealing with the Galaxy, the undertaking is large and programs of this size take time. According to the Chief of the Airlift Aircraft Systems Program Management Division of AFLC, funding may take 7 to 10 years due to the magnitude and cost of the project. Then there is the additional time incurred to meet lead time requirements for the purchase of the hardware. So don't expect any overnight changes, but be assured the original Galaxy will be with us through the year 2020.

CHANGE ONE TO MACRP 127-5, VOLUME XXXII NO. 8—Instant translation: Correction to the August issue of *TMF*. You steely eyed readers never let us miss a note. As we've been gently informed by several of our stalwart fans, the Mishap with a Moral in said issue has a minor problem. It seems that some of our readers have trouble with the following sentences: "There were no fatalities or serious injuries. although three crewmembers and seven passengers suffered was severely damaged(sic)." While we have no problem with the concept, here is the less creative original version: "There were no fatalities or serious injuries, although three crewmembers and seven passengers suffered minor injuries. The aircraftwas severely damaged. As you probably realize, this is a technique we magazine people use, on occasion, to check reader concentration (We wish)! Thanks for the input, all you dead-eye detail determiners.

MAC AIDS MEXICO CITY—In keeping with a tradition of humanitarian relief, Military Airlift Command C-141s and C-5s flew more than 160,000 pounds of supplies and equipment to this capital city on the weekend following the devastating earthquakes of September 19 and 20. The cargo on the six flights included three civilian helicopters, to aid in fire control; a civilian mine safety team and two dogs to help in locating survivors under the rubble. This equipment, and much more was provided by various agencies all around the United States and moved by MAC.

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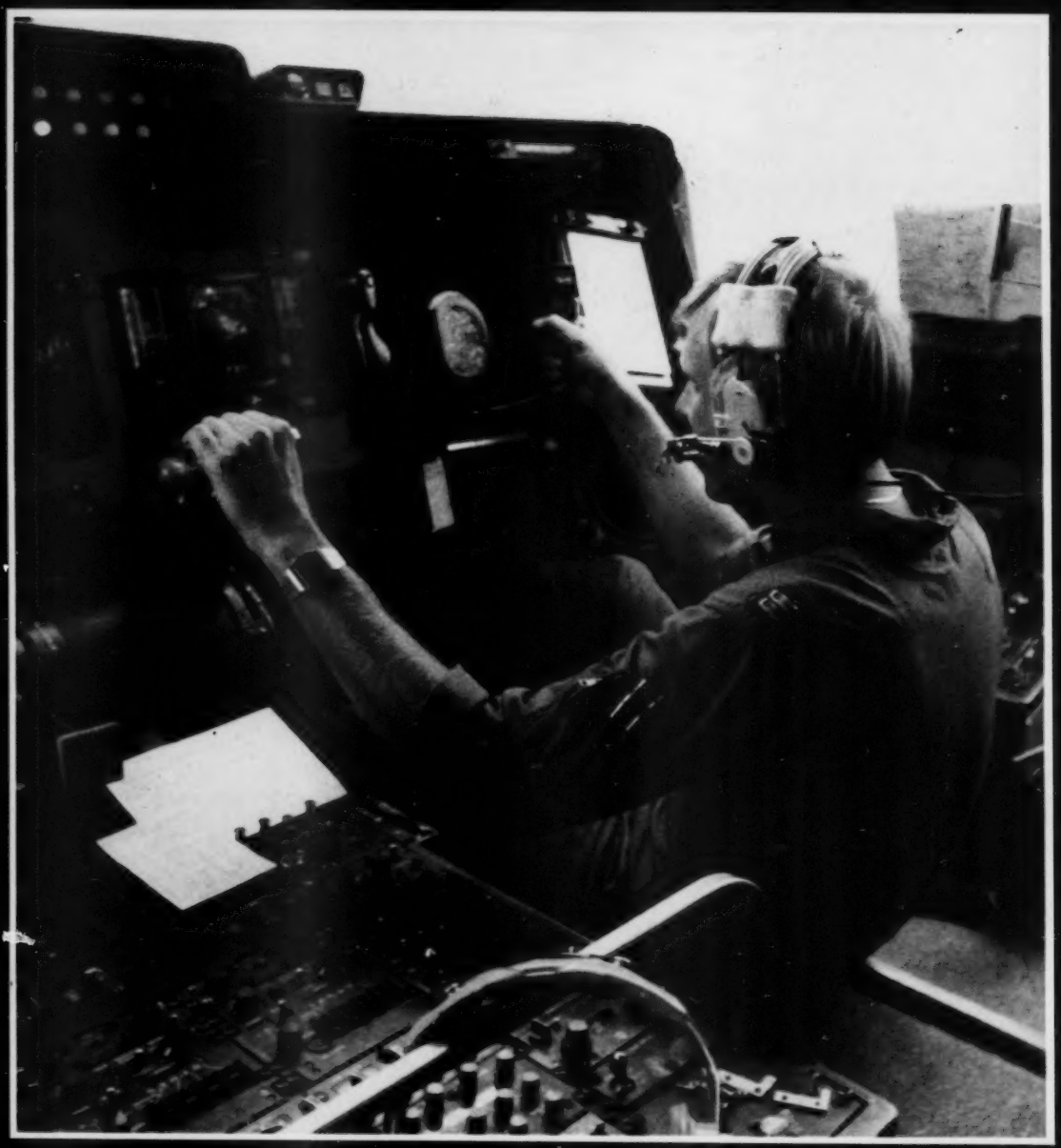
Touch'n Go



No frills sim ride.